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CALCULUS.

156. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

Find the volume common to the two solids $x^2+y^2+z^2=a^2$ and $xz^2=(a-x)(x^2+y^2)$.

157. Proposed by L. C. WALKER, A. M., Petaluma High School, Petaluma, Cal.

Two equal ellipses are tangent to each other at the vertices of the major axes. If one of them be rolled on the other, find (1) the equation and area of the curve described by the vertex, and (2) by the center.

MECHANICS.

146. Proposed by G. B. M. ZERR, A. M., Ph. D., Professor of Chemistry and Physics, The Temple College, Philadelphia, Pa.

A diffraction grating, with lines .05 mm. apart is held in front of a Bunsen's burner in which common salt is volatilized, and, when viewed through a telescope it is found that the angular distances of the first, second, third, fourth, fifth, and sixth bright bands from the central one are respectively 41′, 1°21′, 2°2′, 2°42′, 3°23′ and 4°3′. Required the wave length of sodium light.

147. Proposed by W. J. GREENSTREET, M. A., Editor of The Mathematical Gazette, Stroud, England.

A particle mass m is attached to one end of a string, the other end of which is fixed. It is projected horizontally with such a velocity that it would rise to a position in which the string would be horizontal. But on its upward path it meets an inelastic particle mass m' and the height to which it rises is diminished by $1/p$th of what it would have risen. Find m', and the tensions of the string just after collision and at the greatest height of the particle.

DIOPHANTINE ANALYSIS.

106. Proposed by L. C. WALKER, A. M., Petaluma High School, Petaluma, Cal.

There is a series of rational triangles whose sides have a common difference of unity. Calling the one whose sides are 3, 4, 5 the first triangle, find the sides of the next five triangles, and a general expression for the sides of the nth triangle.

107. Proposed by L. C. WALKER, A. M., Petaluma High School, Petaluma, Cal.

Required the least three positive integral numbers such that the sum of all three of them, and the sum of every two of them shall be a square number.

NOTE.—Problem 105, Diophantine Analysis, May number, should read as follows:

Prove that every factor of $a^{2m}+b^{2m}$ is of the form $1(\text{mod}.2^{m+1})$ where a and b are prime to each other.

AVERAGE AND PROBABILITY.

131. Proposed by LON C. WALKER, A. M., Petaluma High School, Petaluma, Cal.

A sphere is described with its center within a given sphere, and its surface intersecting the surface of the given sphere. The average volume common to both spheres is 10/21 of the volume of the given sphere..